

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED



Prepared in accordance with ASME Y14.24

Vendor item drawing

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PMIC N/A	PREPARED BY RICK OFFICER	DLA LAND AND MARITIME COLUMBUS, OHIO 43218-3990 http://www.dla.mil/landandmaritime	
Original date of drawing YY-MM-DD 18-02-01	CHECKED BY RAJESH PITHADIA	TITLE MICROCIRCUIT, LINEAR, ANALOG MULTIPLIER, MONOLITHIC SILICON	
	APPROVED BY CHARLES F. SAFFLE		
	SIZE A	CODE IDENT. NO. 16236	DWG NO. V62/18603
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DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

1. SCOPE

1.1 Scope. This drawing documents the general requirements of a high performance analog multiplier microcircuit, with an operating temperature range of -55°C to +125°C.

1.2 Vendor Item Drawing Administrative Control Number. The manufacturer's PIN is the item of identification. The vendor item drawing establishes an administrative control number for identifying the item on the engineering documentation:

<u>V62/18603</u> Drawing number	-	<u>01</u> Device type (See 1.2.1)	<u>X</u> Case outline (See 1.2.2)	<u>E</u> Lead finish (See 1.2.3)
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1.2.1 Device type(s).

<u>Device type</u>	<u>Generic</u>	<u>Circuit function</u>
01	AD633-EP	Analog multiplier

1.2.2 Case outline(s). The case outline(s) are as specified herein.

<u>Outline letter</u>	<u>Number of pins</u>	<u>JEDEC PUB 95</u>	<u>Package style</u>
X	8	MO-012-AA	Small outline package

1.2.3 Lead finishes. The lead finishes are as specified below or other lead finishes as provided by the device manufacturer:

<u>Finish designator</u>	<u>Material</u>
A	Hot solder dip
B	Tin-lead plate
C	Gold plate
D	Palladium
E	Gold flash palladium
F	Tin-lead alloy (BGA/CGA)
Z	Other

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1.3 Absolute maximum ratings. 1/

Supply voltage range (VS)	±18 V
Internal power dissipation (PD)	See figure 3
Input voltages	±18 V 2/
Output short circuit duration	Indefinite
Storage temperature range (TSTG)	-65°C to +150°C
Junction temperature range (TJ)	150°C
Lead temperature (soldering, 60 seconds)	260°C
Thermal resistance, junction to ambient (θJC)	42.8°C/W 3/
Thermal resistance, junction to ambient (θJA)	123.9°C/W 4/

1.4 Recommended operating conditions. 5/

Supply voltage range (VS).....	±15 V
Operating ambient temperature range (TA)	-55°C to +125°C

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- 1/ Stresses beyond those listed under “absolute maximum rating” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
- 2/ For supply voltages less than ±18 V, the absolute maximum input voltage is equal to the supply voltage.
- 3/ Thermal impedance simulate values are based on JEDEC 1S0P thermal test board. See JEDEC JESD 51.
- 4/ Thermal impedance simulate values are based on JEDEC 2S2P thermal test board. See JEDEC JESD 51.
- 5/ Use of this product beyond the manufacturers design rules or stated parameters is done at the user’s risk. The manufacturer and/or distributor maintain no responsibility or liability for product used beyond the stated limits.

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2. APPLICABLE DOCUMENTS

JEDEC Solid State Technology Association

- JEDEC JESD51 – Methodology for the Thermal Measurement of Component Packages (Single Semiconductor Device)
- JEDEC PUB 95 – Registered and Standard Outlines for Semiconductor Devices

(Applications for copies should be addressed to the Electronic Industries Alliance, 2500 Wilson Boulevard, Arlington, VA 22201-3834 or online at <https://www.jedec.org>)

3. REQUIREMENTS

3.1 Marking. Parts shall be permanently and legibly marked with the manufacturer's part number as shown in 6.3 herein and as follows:

- A. Manufacturer's name, CAGE code, or logo
- B. Pin 1 identifier
- C. ESDS identification (optional)

3.2 Unit container. The unit container shall be marked with the manufacturer's part number and with items A and C (if applicable) above.

3.3 Electrical characteristics. The maximum and recommended operating conditions and electrical performance characteristics are as specified in 1.3, 1.4, and table I herein.

3.4 Design, construction, and physical dimension. The design, construction, and physical dimensions are as specified herein.

3.5 Diagrams.

3.5.1 Case outline. The case outline shall be as shown in 1.2.2 and figure 1.

3.5.2 Terminal connections. The terminal connections shall be as shown in figure 2.

3.5.3 Maximum power dissipation versus ambient temperature graph. The maximum power dissipation versus ambient temperature graph shall be as shown in figure 3.

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TABLE I. Electrical performance characteristics. 1/

Test	Symbol	Conditions $V_S = \pm 15\text{ V}$, $R_L \geq 2\text{ k}\Omega$	Temperature, T_A	Device type	Limits		Unit
					Min	Max	
Transfer function			25°C	01	$W = \frac{((X1 - X2)(Y1 - Y2))}{10\text{ V}} + Z$		
Multiplier performance							
Total error		$-10\text{ V} \leq X, Y \leq +10\text{ V}$	25°C	01	±1 typical		% full scale
			-55°C to +125°C			±2	
					±3 typical		
Scale voltage error		SF = 10.00 V nominal	25°C	01	±0.25% typical		% full scale
Supply rejection		$V_S = \pm 14\text{ V}$ to $\pm 16\text{ V}$	25°C	01	±0.01 typical		% full scale
Nonlinearity, X		$X = \pm 10\text{ V}$, $Y = \pm 10\text{ V}$	25°C	01	±0.4 typical		% full scale
						±1	
					±0.1 typical		
Nonlinearity, Y		$Y = \pm 10\text{ V}$, $X = \pm 10\text{ V}$	25°C	01	±0.1 typical		% full scale
						±0.4	
					±0.3 typical		
X feedthrough		Y nulled, $X = \pm 10\text{ V}$	25°C	01	±0.3 typical		% full scale
						±1	
					±0.1 typical		
Y feedthrough		X nulled, $Y = \pm 10\text{ V}$	25°C	01	±0.1 typical		% full scale
						±0.4	
					±5 typical		
Output offset voltage $\underline{2}$ /	VOS		25°C	01	±5 typical		mV
						±50	
Dynamics							
Small signal bandwidth	SSBW	$V_O = 0.1\text{ V rms}$	25°C	01	1 typical		MHz
Slew rate	SR	$V_O = 20\text{ Vp-p}$	25°C	01	20 typical		V/μs
Settling time	t_s	$\Delta V_O = 20\text{ V}$	25°C	01	2 typical		μs

See footnotes at end of table.

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TABLE I. Electrical performance characteristics – Continued. 1/

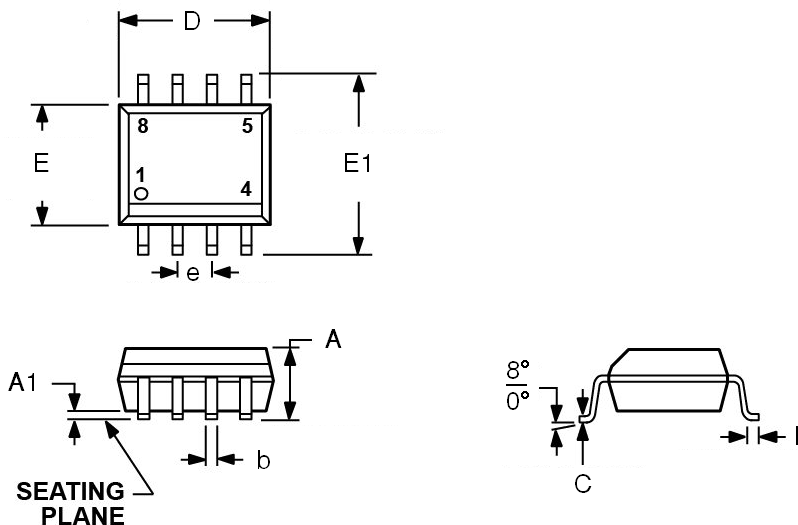
Test	Symbol	Conditions $V_S = \pm 15\text{ V}$, $R_L \geq 2\text{ k}\Omega$	Temperature, T_A	Device type	Limits		Unit
					Min	Max	
Output noise							
Spectral density			25°C	01	0.8 typical		$\mu\text{V}/\sqrt{\text{Hz}}$
Wideband noise		$f = 10\text{ Hz to } 5\text{ MHz}$	25°C	01	1 typical		mV rms
		$f = 10\text{ Hz to } 10\text{ kHz}$			90 typical		$\mu\text{V rms}$
Output							
Output voltage swing			25°C	01	± 11		V
Short circuit current	I _{OS}	$R_L = 0\ \Omega$	25°C	01	30 typical		mA
						40	
Input amplifiers							
Signal voltage range		Differential	25°C	01	± 10		V
		Common mode			± 10		
Offset voltage (X, Y)			25°C	01	± 5 typical		mV
						± 30	
Common mode rejection ratio (X, Y)		$V_{CM} = \pm 10\text{ V}$, $f = 50\text{ Hz}$	25°C	01	80 typical		dB
					60		
Bias current (X, Y, Z)			25°C	01	0.8 typical		μA
						2.0	
Differential resistance			25°C	01	10 typical		$\text{M}\Omega$
Power supply							
Supply voltage							
Rated performance			25°C	01	± 15 typical		V
Operating range			25°C	01	± 8	± 18	V
Supply current		Quiescent	25°C	01	4 typical		mA
						6	

1/ Testing and other quality control techniques are used to the extent deemed necessary to assure product performance over the specified temperature range. Product may not necessarily be tested across the full temperature range and all parameters may not necessarily be tested. In the absence of specific parametric testing, product performance is assured by characterization and/or design.

2/ Allow approximately 0.5 ms for settling following power on.

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Case X



Symbol	Dimensions			
	Inches		Millimeters	
	Minimum	Maximum	Minimum	Maximum
A	.0532	.0688	1.35	1.75
A1	.0040	.0098	0.10	0.25
b	.0122	.0201	0.31	0.51
c	.0067	.0098	0.17	0.25
D	.1890	.1968	4.80	5.00
E	.1497	.1574	3.80	4.00
E1	.2284	.2441	5.80	6.20
e	.0500 BSC		1.27 BSC	
L	.0157	.0500	.40	1.27

NOTES:

1. Controlling dimensions are millimeter, inch dimensions are given for reference only.
2. Falls within reference to JEDEC MS-012-AA.

FIGURE 1. Case outline - Continued.

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Device type	01	
Case outline	X	
Terminal number	Terminal symbol	Description
1	Y1	Y multiplicand noninverting input.
2	Y2	Y Multiplicand inverting input.
3	-VS	Negative supply rail.
4	Z	Summing input.
5	W	Product output.
6	+VS	Positive supply rail.
7	X1	X multiplicand noninverting input.
8	X2	X Multiplicand inverting input.

FIGURE 2. Terminal connections.

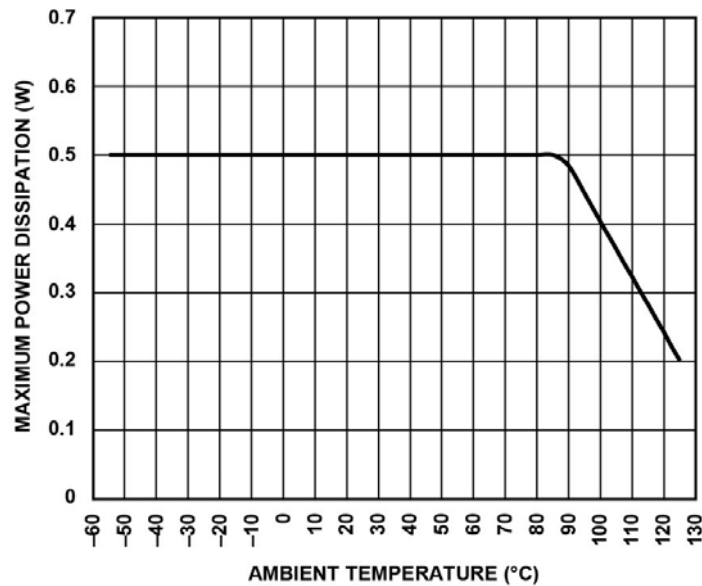


FIGURE 3. Maximum power dissipation versus ambient temperature graph.

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4. VERIFICATION

4.1 Product assurance requirements. The manufacturer is responsible for performing all inspection and test requirements as indicated in their internal documentation. Such procedures should include proper handling of electrostatic sensitive devices, classification, packaging, and labeling of moisture sensitive devices, as applicable.

5. PREPARATION FOR DELIVERY

5.1 Packaging. Preservation, packaging, labeling, and marking shall be in accordance with the manufacturer's standard commercial practices for electrostatic discharge sensitive devices.

6. NOTES

6.1 ESDS. Devices are electrostatic discharge sensitive and are classified as ESDS class 1 minimum.

6.2 Configuration control. The data contained herein is based on the salient characteristics of the device manufacturer's data book. The device manufacturer reserves the right to make changes without notice. This drawing will be modified as changes are provided.

6.3 Suggested source(s) of supply. Identification of the suggested source(s) of supply herein is not to be construed as a guarantee of present or continued availability as a source of supply for the item. DLA Land and Maritime maintains an online database of all current sources of supply at <https://landandmaritimeapps.dla.mil/programs/smcr/>.

Vendor item drawing administrative control number <u>1/</u>	Device manufacturer CAGE code	Mode of transportation and quantity	Vendor part number
V62/18603-01XE	24355	Tube, 98 units	AD633TRZ-EP
V62/18603-01XE	24355	Reel, 1,000 units	AD633TRZ-EP-R7

1/ The vendor item drawing establishes an administrative control number for identifying the item on the engineering documentation.

CAGE code

24355

Source of supply

Analog Devices
 Route 1 Industrial Park
 P.O. Box 9106
 Norwood, MA 02062
 Point of contact: Raheen Business Park
 Limerick, Ireland

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